CLAIMS

1. A photovoltaic device comprising:

an anode;

a cathode; and

at least one photoactive layer between the anode and the cathode, wherein the at least one photoactive layer comprises a composition comprising a polymer having a glass transition temperature of at least 125 °C and a photoactive material, wherein: (a) the photoactive material is at least one member selected from the group consisting of a hole transporting organic material, an electron transporting organic material, and a light harvesting organic material, (b) the polymer and the photoactive material are in a single phase, (c) the photoactive material constitutes at least 20% by weight of the composition, and (d) the at least one photoactive layer is in electrical communication with the anode and the cathode, wherein the anode and the cathode are configured to conduct an electric charge from the at least one photoactive layer produced by the at least one photoactive layer absorbing light.

2. The photovoltaic device of claim 1, wherein at least one of the anode and the cathode is transparent and the photovoltaic device further comprises a transparent substrate on a side of the anode or the cathode facing away from the at least one photoactive layer.

3. The photovoltaic device of claim 2, wherein the anode is transparent and the transparent substrate is on a side of the anode.

4. The photovoltaic device of claim 3, wherein the polymer of the composition is amorphous and not conductive.

5. The photovoltaic device of claim 3, wherein the glass transition temperature of the polymer of the composition is at least 150 °C.

6. The photovoltaic device of claim 3, wherein the polymer of the composition is a member selected from the group consisting of polycarbonate, polyarylate, polyimide, poly(amide-imide), poly(aryl ether), and polyestercarbonate.

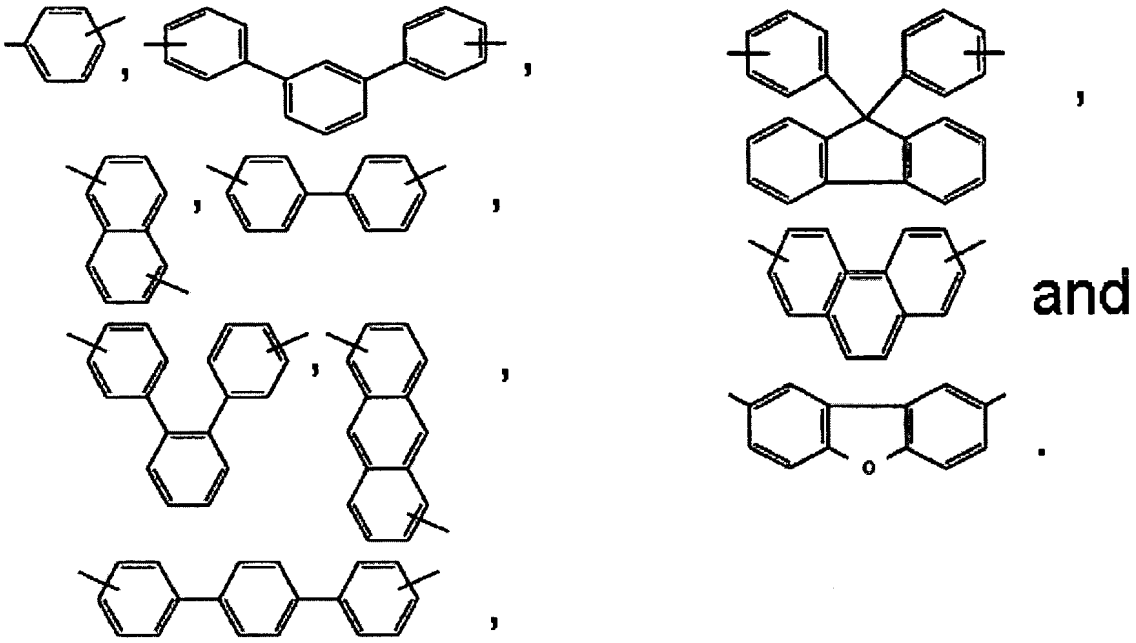
7. The photovoltaic device of claim 3, wherein the polymer of the composition is at least one of poly(2,6-dimethyl-1,4-phenylene oxide) or a product of condensing 4,4'-dibromobiphenyl with 9,9-bis(4-hydroxyphenyl)fluorene.

8. The photovoltaic device of claim 3, wherein the polymer is poly(arylene ether) comprising repeating units of a structure:

$$-(-O-Ar^1-O-Ar^2-)_m-(-O-Ar^3-O-Ar^4-)_n-$$

wherein m is 0 to 1, n is 1-m and Ar^1, Ar^2, Ar^3 and Ar^4 are independently divalent arylene radicals.

9. The photovoltaic device of claim 8, wherein Ar^1, Ar^2, Ar^3 and Ar^4 are divalent arylene radicals independently selected from the group consisting of:



provided that Ar^1, Ar^2, Ar^3 and Ar^4 cannot be isomeric equivalents other than diradical 9,9-diphenylfluorene.

10. The photovoltaic device of claim 8, wherein m is 0.5 and n is 0.5.

11. The photovoltaic device of claim 3, wherein the photoactive material constitutes at least 50 percent by weight of the composition of the photoactive layer

12. The photovoltaic device of claim 3, wherein the photoactive material of the composition contains a hole transporting organic material selected from the group consisting of 4-(dicyanomethylene)-2-methyl-6-(4-dimethylaminostyryl)-4H-pyran (DCM), tetrathiofulvalene (TTF), α-quaterthiophene, α-hexathiophene, thiophene derivatives, oligophenylenevinylenes, oligofluorenes, phthalocyanines, porphyrins, aryl amine derivative, 4,4',4"-Tris(N-(2-naphthyl)-N-phenyl-amino)-triphenylamine, N,N'-bis(4-methylphenyl)-N,N'-bis(phenyl)-benzidine, and N,N'-di(naphthalene-2-yl)-N,N'-diphenylbenzidine.

13. The photovoltaic device of claim 3, wherein the photoactive material of the composition contains an electron transporting organic material selected from the group consisting of 2,4,7-trinitrofluorenone, ortho-benzoquinone, tetracyanoquindomethane

(TCNQ), tetracyanoethylene, perylene derivatives, N,N'-bis(2,5-di-tert-butylphenyl)-3,4,9,10-perylenedicarboximide, perylene-3,4,9,10-tetracarboxylicdianhydride (PTCDA), N,N'-bis(1-ethylpropyl)-3,4,9,10-perylene bis(tetracarboxyl diimide) (EP-PTC), and N,N'-ditridecyl-3,4,19,10-perylenetetracarboxylicdiimide.

14. The photovoltaic device of claim 3, wherein the photoactive material of the composition contains a light harvesting organic material selected from the group consisting of Rhodamine dyes, pyrromethene dyes, perylenes, Coumarin dyes, and 4-(dicyanomethylene)-2-methyl-6-(4-dimethylaminostyryl)-4H-pyran (DCM).

15. The photovoltaic device of claim 3, wherein there are two of said at least one photoactive layer, including a first photoactive layer containing the electron transporting material and a second photoactive layer containing the hole transporting material.

16. The photovoltaic device of claim 15, wherein the first photoactive layer is in contact with the cathode and the second photoactive layer is in contact with the anode.

17. The photovoltaic device of claim 15, wherein the at least one photoactive layer further comprises a third photoactive layer in communication with at least one of the first photoactive layer and the second photoactive layer, the third photoactive layer containing the light harvesting material.

18. The photovoltaic device of claim 17, wherein the third photoactive layer is placed between the first photoactive layer and the second photoactive layer.

19. The photovoltaic device of claim 17, wherein the first photoactive layer is in contact with the cathode and the second photoactive layer is in contact with the anode.

20. The photovoltaic device of claim 15, further comprising a photoactive layer consisting essentially of the photoactive material.

21. The photovoltaic device of claim 3, further comprising a photoactive layer consisting essentially of the photoactive material.

22. The photovoltaic device of claim 2, further comprising the light harvesting material, wherein the light harvesting material is coated on an outer side of the transparent substrate and/or mixed with the transparent substrate.

23. A method for manufacturing the photovoltaic device of claim 1, said method comprising:

providing an anode;

providing a cathode; and

providing at least one photoactive layer between the anode and the cathode, wherein the at least one photoactive layer is in electrical communication with the anode and the cathode and wherein the anode and the cathode are configured to conduct an electric charge from the at least one photoactive layer produced by the at least one photoactive layer absorbing light.

24. The method of claim 23, wherein the at least one photoactive layer is manufactured by a fabrication technique selected from the group consisting of spin coating, screen printing, ink jet printing and roll-to-roll printing.

25. The method of claim 23, wherein the anode is provided on a first side of the at least one photoactive layer, the cathode is provided on a second side of the at least one photoactive layer, and a transparent substrate is provided on a side of the anode facing away from the at least one photoactive layer.